CLAIMS

WHAT IS CLAIMED IS:

1. A method for measuring conductance of a sample using an eddy current probe comprising a sensing coil, comprising:

(a) with the eddy current probe at a first separation from the sample, and with an AC voltage in the sensing coil, measuring a first voltage pair comprising in-phase and quadrature components of an induced AC voltage in the sensing coil;

(b) with the eddy current probe at the first separation from a reference material, and with the AC voltage in the sensing coil, measuring a second voltage pair comprising in-phase and quadrature components of an induced AC voltage in the sensing coil;

(c) calibrating the first signal based on the measured second signal;

(d) performing N repetitions of operations (a) and (b), where N is a positive integer, with the eddy current probe at a different separation from the sample and reference material during each of said repetitions;

(e) determining a conductance function relating conductance with location along the selected curve; and

(f) after operations (a) through (e), processing the calibrated first voltage pairs obtained in operations (a) through (c) to generate a lift-off curve, determining an intersection voltage pair representing intersection of the lift-off curve with a selected curve, and determining the conductance of the sample from the intersection voltage pair and the conductance function.

2. The method of claim 1, operation (f) further comprising:

(g) for each of several eddy current probe separations from a first reference sample of known conductance, and with an AC voltage in the drive coil, measuring an induced voltage pair comprising in-phase and quadrature components of an induced AC voltage in the sensing coil, and processing said induced voltage pairs to generate a reference lift-off curve;

(h) repeating operation (g) for each of a number of different reference samples of known conductance; and

(i) processing the reference lift-off curves generated during operations (g) and (h) to determine reference intersection voltage pairs representing intersections of the reference lift-off curves with the selected curve, and generating the conductance function from said reference intersection voltage pairs.

3. A chemical mechanical polishing (CMP) system for polishing a sample with a polishing agent and monitoring the sample, the CMP system comprising:

a polishing table;

a polishing pad arranged over the polishing table;

a sample carrier arranged to hold the sample over the polishing pad of the polishing table, the polishing pad and sample carrier being arranged to receive a polishing agent between the sample and the polishing pad and to polish the sample by moving the polishing pad and the sample carrier relative to each other; and

a measurement device for obtaining information regarding the polishing pad while the sample is being polished.

4. A CMP system as recited in claim 3, wherein the measurement device comprises:

an AC voltage source;

a sensing coil coupled with the AC voltage source so that the AC voltage source is operable to induce an AC voltage on the sensing coil;

an impedance meter coupled with the sensing coil that detects a change in the AC voltage on the sensing coil;

a memory having programming instructions; and

a processor coupled with the memory, the processor and memory being adapted for causing the AC voltage to be induced on the sensing coil

and analyzing the change in the AC voltage on the sensor to obtain the information regarding the polishing pad.

5. A CMP system as recited in claim 4, wherein the processor and memory are adapted for:

(a) measuring one or more first signals in the sensing coil when the sensing coil is positioned proximate the film of the sample;

(b) measuring one or more second signals in the sensing coil when the sensing coil is positioned proximate to a reference material having a known composition and distance from the sensing coil;

(c) calibrating the first signals based on the second signals so that asymmetric gain changes within the first signal are reduced; and

(d) determining a property value of the film based on a selected one of the calibrated first signal.

6. A CMP system as recited in claim 5, wherein the information regarding the polishing pad is a thickness of the pad that is obtained based on an amount of distance change between the sensing coil and the reference material based on the first signals.